

## What is claimed is:

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1. A Coriolis mass flow rate/density/viscosity sensor designed to be installed in a pipe through which a fluid flows at least temporarily, and comprising:

- 10    - a first measuring tube bent to a V shape in a first plane  
         symmetrically with respect to a first axis of symmetry;  
         - a second measuring tube bent to a V shape in a second  
         plane symmetrically with respect to a second axis of  
         symmetry,
- 15    -- which measuring tubes are arranged parallel to each  
         other and are each of one-piece construction, and  
         -- each of which measuring tubes has  
         --- a straight inlet portion with an inlet axis lying in  
         the first plane and second plane, respectively,
- 20    --- a straight outlet portion with an outlet axis lying in  
         the first plane and second plane, respectively, and  
         aligned with the inlet axis,  
         --- an inlet bend connected with the inlet portion,  
         --- an outlet bend connected with the outlet portion,
- 25    --- a first straight tube portion connected with the inlet  
         bend,  
         --- a second straight tube portion connected with the  
         outlet bend, and  
         --- a vertex bend connected with the first and second
- 30    straight tube portions,  
         ---- which inlet portions are fixed in an inlet manifold,  
         which outlet portions are fixed in an outlet manifold,  
         and  
         ---- which manifolds are mounted in a support frame which
- 35    forms part of a housing;  
         - an excitation arrangement

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- which in operation causes the measuring tubes to vibrate as a tuning fork,
  - a first portion of which is fixed to the vertex bend of the first measuring tube in the area of the axis of symmetry of the first measuring tube, and
  - a second portion of which is fixed to the vertex bend of the second measuring tube in the area of the axis of symmetry of the second measuring tube;
  - a first velocity or displacement sensor,
  - a first portion of which is fixed to the first straight tube portion of the first measuring tube, and
  - a second portion of which is fixed to the first straight tube portion of the second measuring tube;
  - a second velocity or displacement sensor, positioned symmetrically with respect to the axes of symmetry of the measuring tubes,
  - a first portion of which is fixed to the second straight tube portion of the first measuring tube, and a second portion of which is fixed to the second straight tube portion of the second measuring tube;
  - a feedthrough mounted in the support frame opposite the vertex bends and containing several electric conductors; and
  - a printed-circuit board attached to the support frame and extending between the support frame and the vertex bends and having conducting tracks
  - to which leads of the excitation system and of the velocity or displacement sensors are connected.
2. The Coriolis mass flow rate/density/viscosity sensor as claimed in claim 1 wherein the measuring tubes
- are rigidly connected by a first node plate in the vicinity of a location
  - where the respective inlet portion passes into the respective inlet bend,

- are rigidly connected by a second node plate in the vicinity of a location
  - where the respective inlet bend passes into the respective first straight tube portion,
  - 5 - are rigidly connected by a third node plate in the vicinity of a location
  - where the respective outlet portion passes into the respective outlet bend, and
  - are rigidly connected by a fourth node plate in the vicinity of a location
  - 10 -- where the respective outlet bend passes into the respective second straight tube portion.
3. The Coriolis mass flow rate/density/viscosity sensor as claimed in claim 1 or 2 wherein electrodynamic velocity sensors are used and the excitation system is of the electrodynamic type.
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4. The Coriolis mass flow rate/density/viscosity sensor as claimed in anyone of claims 1 to 3 wherein
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- the support frame is of one-piece construction and is made of stainless sheet steel of constant width and thickness having a front face and a rear face, comprises:
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- a plane inlet frame portion, which has the inlet manifold welded therein,
  - a plane outlet frame portion, which has the outlet manifold welded therein,
  - a plane feedthrough frame portion connecting the inlet frame portion and outlet frame portion and having the feedthrough mounted therein in a pressure-tight manner,
  - 30 -- a first plane extension frame portion extending from the inlet frame portion at an angle greater than 90°,
  - a bent vertex frame portion passing into the first extension frame portion, and
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- a second plane extension frame portion extending from the outlet frame portion at said angle and passing into the vertex frame portion; and
  - the support frame is supplemented by a plane front sheet of stainless steel, which is welded to the front, and a plane rear sheet of the same steel, which is welded to the rear face, to form the housing.
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5. The Coriolis mass flow rate/density/viscosity sensor as claimed in anyone of claims 1 to 4 wherein the feedthrough comprises:
- a flange attached to the support frame and having a hole;
  - the printed-circuit board, which is passed through a slot formed in the feedthrough frame portion and extends into the flange, with the printed-circuit board and the slot separated by a distance sufficient for electric isolation;
  - a disk of insulating material resting on the feedthrough frame portion and through which the printed-circuit board is passed; and
  - an insulating compound filling a portion of the hole lying above the disk, the insulating compound having a thickness at least equal to the gap length specified for type of protection Ex-d as a function of gap width.